



## DEPARTMENT OF ENERGY

[Case Number 2019-010; EERE-2019-BT-WAV-0029]

### **Energy Conservation Program: Decision and Order Granting a Waiver to Air Innovations from the Department of Energy Walk-in Coolers and Walk-in Freezers Test Procedure**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Notification of decision and order.

**SUMMARY:** The U.S. Department of Energy (“DOE”) gives notification of a Decision and Order (Case Number 2019-010) that grants to Air Innovations a waiver from specified portions of the DOE test procedure for determining the energy efficiency of specified walk-in wine cellar refrigeration systems. Due to the design of Air Innovations’ specific basic models of walk-in wine cellar refrigeration systems, the current test procedure evaluates such models in a manner that is unrepresentative of their energy use. Air Innovations is required to test and rate the specified basic models of its walk-in cellar refrigeration systems in accordance with the alternate test procedure set forth in the Decision and Order.

**DATES:** The Decision and Order is effective on [INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. The Decision and Order will terminate upon the compliance date of any future amendment to the test procedure for walk-in coolers and walk-in freezers located at title 10 of the Code of Federal Regulations (“CFR”), part 431, subpart R, appendix C that addresses the issues presented in this waiver. At such time, Air Innovations must use the relevant test procedure for this product for any testing to demonstrate compliance with the applicable standards, and any other representations of energy use.

### **FOR FURTHER INFORMATION CONTACT:**

Ms. Lucy deButts, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. E-mail: [AS\\_Waiver\\_Requests@ee.doe.gov](mailto:AS_Waiver_Requests@ee.doe.gov).

Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, Mail Stop GC-33, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585-0103. Telephone: (202) 586-8145. Email: *Michael.Kido@hq.doe.gov*.

**SUPPLEMENTARY INFORMATION:**

In accordance with section 431.401(f)(2) of Title 10 of the Code of Federal Regulations (“CFR”) (10 CFR 431.401(f)(2)), DOE gives notification of the issuance of its Decision and Order as set forth below. The Decision and Order grants Air Innovations a waiver from the applicable test procedure at 10 CFR part 431, subpart R, appendix C for specified basic models of walk-in cooler refrigeration systems, and provides that Air Innovations must test and rate such walk-in cooler refrigeration systems using the alternate test procedure specified in the Decision and Order. Air Innovations’ representations concerning the energy efficiency of the specified basic models must be based on testing according to the provisions and restrictions in the alternate test procedure set forth in the Decision and Order, and the representations must fairly disclose the test results. Distributors, retailers, and private labelers are held to the same requirements when making representations regarding the energy efficiency of these products. (42 U.S.C. 6314(d))

Consistent with 10 CFR 431.401(j), not later than **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**, any manufacturer currently distributing in commerce in the United States products employing a technology or characteristic that results in the same need for a waiver from the applicable test procedure must submit a petition for waiver. Manufacturers not currently distributing such products in commerce in the United States must petition for and be granted a waiver prior to the distribution in commerce of those products in the United States. Manufacturers may also submit a request for interim waiver pursuant to the requirements of 10 CFR 431.401. (10 CFR 431.401(j))

**Decision and Order**

**I. Background and Authority**

The Energy Policy and Conservation Act, as amended (“EPCA”),<sup>1</sup> authorizes the U.S. Department of Energy (“DOE”) to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C<sup>2</sup> of EPCA established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve the energy efficiency for certain types of industrial equipment. This equipment includes walk-in coolers and walk-in freezers (collectively, “walk-ins”), the focus of this document. (42 U.S.C. 6311(1)(G))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6311), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6313), and the authority to require information and reports from manufacturers (42 U.S.C. 6316; 42 U.S.C. 6299).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use these test procedures to determine whether the

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<sup>1</sup> All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116-260 (Dec. 27, 2020).

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part C was redesignated as Part A-1.

equipment complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s))

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered walk-ins. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use or estimated annual operating cost of walk-ins during a representative average use cycle and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C.6314(a)(2)) The test procedure for walk-ins is set forth in the Code of Federal Regulations (“CFR”) at 10 CFR part 431, subpart R, appendix C, *Uniform Test Method for the Measurement of Net Capacity and AWEF of Walk-in Cooler and Walk-in Freezer Refrigeration Systems* (“Appendix C”).

Any interested person may submit a petition for waiver from DOE’s test procedure requirements. 10 CFR 431.401(a)(1). DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 431.401(f)(2). DOE may grant the waiver subject to conditions, including adherence to alternate test procedures. *Id.*

As soon as practicable after the granting of any waiver, DOE will publish in the *Federal Register* a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. 10 CFR 431.401(l). As soon thereafter as practicable, DOE will publish in the *Federal Register* a final rule to that effect. *Id.* When DOE amends the test procedure to address the issues presented in a waiver, the waiver will automatically terminate on

the date on which use of that test procedure is required to demonstrate compliance. 10 CFR 431.401(h)(3).

## **II. Air Innovations' Petition for Waiver: Assertions and Determinations**

On September 23, 2019, Air Innovations submitted a petition for an interim waiver from the DOE test procedure applicable to walk-ins set forth in Appendix C. (Air Innovations, No. 1 at p. 1<sup>3</sup>) The waiver process under 10 CFR 431.401 requires that a petition for interim waiver must reference the related petition for waiver. (10 CFR 431.401(b)(2)) Air Innovations confirmed in a May 21, 2020 email that the petition should also be considered as a petition for waiver. (Air Innovations, No. 4) Air Innovations stated that the specified basic models of walk-in cooler refrigeration systems are intended to operate at a temperature range of 45 to 65 °F and 50 to 70 percent relative humidity (“RH”), rather than the 35 °F with less than 50 percent RH test conditions prescribed by the test procedure for walk-in cooler applications. Air Innovations stated that the units operate at temperature and relative humidity ranges optimized for long-term storage of wine, reflecting conditions in natural caves, and that they are usually located in air-conditioned spaces. Air Innovations asserted that testing at 35 °F would be unrepresentative of the true energy consumption characteristics of the specified units and that operation at this temperature may damage the specified units. On October 19, 2020, Air Innovations submitted an updated petition for waiver and interim waiver stating that all basic models listed in the petition for waiver and interim waiver cannot be operated at a temperature less than 45 °F and

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<sup>3</sup> A notation in the form “Air Innovations, No. 1” identifies a written submission: (1) Made by Air Innovations; and (2) recorded in document number 1 that is filed in the docket of this petition for waiver (Docket No. EERE–2019–BT–WAV–0029) and available at <http://www.regulations.gov>.

provided DOE with maximum external static pressure values for specified ducted self-contained and ducted split system basic models.<sup>4</sup> (Air Innovations, No. 6)

On January 12, 2021, DOE published a notification announcing its receipt of the petition for waiver and granted Air Innovations an interim waiver. 86 FR 2403 (“Notification of Petition for Waiver”). In the Notification of Petition for Waiver, DOE noted that the through-the-wall (TTW018) and ducted self-contained (D025, D050, D088, and D200) basic models of walk-in refrigeration systems identified in Air Innovations’ waiver petition are single-package systems. Although not explicitly identified by Air Innovations, DOE recognized that because of their single-package design, these basic models have insufficient space within the units and insufficient lengths of liquid line and evaporator outlet line for the dual mass flow meters (i.e. two independent meters) and the dual temperature and pressure measurements (i.e. two independent sets of measurement equipment with separate temperature and pressure sensors) required by the test procedure’s refrigerant enthalpy method. 86 FR 2403, 2405. AHRI 1250–2009 (“Standard for Performance Rating of Walk-in Coolers and Freezers”<sup>5</sup>) – the industry testing standard on which DOE’s test procedure is based -- does not include specific provisions for testing single-package systems, and testing these basic models using the refrigerant enthalpy method as required by Appendix C would require extensive additional piping to route the pipes out of the system—where the components could be installed—and then back in. This additional piping would impact unit performance, would likely be inconsistent between test labs, and would result in unrepresentative test values for the unit under test. AHRI has published a revised

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<sup>4</sup> The October 19, 2020 update was consistent with a letter from the Air-Conditioning, Heating, and Refrigeration Institute (“AHRI”) recommending that a 45 °F minimum temperature be used for testing wine cellar cooling systems, and that testing be conducted at an external static pressure (“ESP”) value equal to 50 percent of the maximum ESP to be specified by manufacturers for each basic model. The AHRI letter is available at Docket No. EERE- 2019–BT–WAV–0029–0005. The ESP values from Air Innovations were submitted as confidential business information and are redacted from the publicly-available version of the company’s submission.

<sup>5</sup> This also includes the related Errata sheet published by AHRI, dated December 2015.

version of the test standard that provides provisions for single-package systems without requiring extensive additional piping (AHRI 1250–2020, *2020 Standard for Performance Rating of Walk-in Coolers and Freezers*).

In the Notification of Petition for Waiver, DOE established an alternate test procedure that was a modified version of the alternate test procedure suggested by Air Innovations. 86 FR 2403, 2406-2407. Specifically, the required alternate test procedure establishes unit cooler air inlet conditions of 55 °F and 55 percent RH, specifies primary and secondary capacity measurement methods for single-package systems, requires testing at 50 percent of maximum external static pressure for ducted units, and defines wine cellar box load and evaporator cycle periods for calculation of Annual Walk-in Energy Factor (“AWEF”) for the specified basic models of walk-in cooler refrigeration systems. *Id.* DOE solicited comments from interested parties on all aspects of the petition and the modified alternate test procedure. *Id.*

DOE received one comment, which was submitted by the Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison (collectively, “the CA IOUs”).<sup>6</sup> The CA IOUs recommended that DOE consider changes to the walk-in cooler and walk-in freezer labeling requirements and to the definitions applicable to walk-in cooler refrigeration systems in order to differentiate between walk-in cooler refrigeration systems and walk-in cooler refrigeration systems that are wine cooler systems. The CA IOUs stated that the current labeling requirements would classify a wine cellar walk-in cooler as a standard walk-in cooler, despite the difference in testing requirements. The CA IOUs suggested that manufacturer materials should be required to report use of an alternate test procedure. The CA IOUs stated that otherwise, there may be confusion in the market. (CA IOUs, No 12 at pp. 1-2)

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<sup>6</sup> Comments available in Docket No. EERE-2019-BT-WAV-0029 at <http://www.regulations.gov>.

The current definition and labeling requirements for walk-in coolers do not distinguish between walk-in cooler refrigeration systems generally and walk-in cooler refrigeration systems for wine cellars. As discussed, Air Innovations stated that the subject units are unable to operate at a temperature less than 45 °F. Because of the inability to operate at lower temperatures and the specific application to wine cellars, there is unlikely to be confusion in the market between the subject units and other walk-in cooler refrigeration systems.

In addition, the CA IOUs reiterated comments that they submitted in response to a notice of proposed rulemaking regarding testing provisions for hot gas defrost in the walk-in cooler test procedure (85 FR 60724; September 28, 2020).<sup>7</sup> Specifically, the CA IOUs recommended that DOE address several open test procedure waivers (including those for walk-in wine cellars) and recommendations from the 2015 Appliance Standards and Rulemaking Federal Advisory Committee working group related to improving the representativeness of the test procedure.

In accordance with 10 CFR 431.401, this Decision and Order addresses the petition for waiver submitted by Air Innovations and is limited to the basic models specified in the Order. As stated, as soon as practicable after the granting of this and any waiver, DOE will publish in the *Federal Register* a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. 10 CFR 431.401(l).

For the reasons explained here and in the Notification of Petition for Waiver, absent a waiver the basic models identified by Air Innovations in its petition cannot be tested and rated for energy consumption on a basis representative of their true energy consumption characteristics. As noted above, the alternate test procedure prescribed in the Interim Waiver modified Air Innovations' suggested alternate test procedure by including ESP provisions for

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<sup>7</sup> Comments available in Docket No. EERE-2020-BT-TP-0016-0004 at <https://www.regulations.gov>.



certain systems that can be installed with (1) ducted evaporator air, (2) with or without ducted evaporator air, (3) ducted condenser air, or (4) with or without ducted condenser air. For such systems, testing is conducted at 50 percent of the maximum ESP specified by the manufacturer, subject to a tolerance of -0.00/+0.05 inches of water column (“in. wc.”) (Air Innovations, No. 5)

Selection of a representative ESP equal to half the maximum ESP is based on the expectation that most installations will require less than the maximum allowable duct length. In the absence of field data, DOE expects that a range of duct lengths from the minimal length to the maximum allowable length would be used; thus, half of the maximum ESP would be representative of most installations.

Additionally, if the basic model provides multiple condenser or fan-coil (unit cooler) fan speed settings, the speed setting used is as instructed in the unit’s installation instructions. However, if the installation instructions do not specify a fan speed setting for ducted installation, systems that can be installed with ducts would be tested with the highest available fan speed. The ESP is set for testing either by symmetrically restricting the outlet duct or, if using the indoor air enthalpy method, by adjusting the airflow measurement apparatus blower.

The alternate test procedure also describes the requirements for measuring ESP consistent with the provisions provided in AHRI 1250-2020 when using the indoor air enthalpy method with unit coolers.

Additionally, the alternate test procedure requires that specified basic models that are split systems must be tested as matched pairs. According to Air Innovations’ petition, the walk-in refrigeration system basic models that are split-systems are sold as full systems (*i.e.*, matched pairs) rather than as individual unit cooler and condensing unit components. This Order provides no direction regarding refrigerant line connection operating conditions, and as such is

inapplicable to testing the basic models as individual components. Consequently, this Order addresses only matched-pair testing of the specified basic models that are split-systems.

For the reasons explained in the Notification of Petition for Waiver, the Order does not include a 0.55 correction factor in the alternate test procedure as suggested by Air Innovations. 86 FR 2403, 2407-2408. The company had observed that the test procedure in appendix A to subpart B of 10 CFR part 430 (“Appendix A”), which applies to miscellaneous refrigeration products, includes such a factor to account for the difference in use and loading patterns of coolers (*e.g.*, self-contained wine chiller cabinets) as compared to other residential refrigeration products, and sought to include such a factor as part of its petition. As explained in the Notice of Petition for Waiver, the closed-door conditions on which the miscellaneous refrigeration correction factor is based are not present in the test procedure for walk-in cooler refrigeration systems, and the referenced AHRI 1250-2009 provisions assume a load factor of 50 percent, consistent with Appendix C. *Id.* As a result, applying the 0.55 correction factor as suggested by Air Innovations is not appropriate for the specified basic models.

DOE is requiring that Air Innovations test and rate specified walk-in wine cellar refrigeration system basic models according to the alternate test procedure specified in this Decision and Order. This alternate procedure is a modified version of the one suggested by Air Innovations. The alternate test procedure required under this Order is the same alternate test procedure prescribed in the Interim Waiver Order.

This Decision and Order applies only to the basic models listed and does not extend to any other basic models. DOE evaluates and grants waivers for only those basic models specifically set out in the petition, not future models that may be manufactured by the petitioner. Air Innovations may request that DOE extend the scope of this waiver to include additional basic models that employ the same technology as those listed in this waiver. 10 CFR 431.401(g). Air Innovations may also submit another petition for waiver from the test procedure for additional

basic models that employ a different technology and meet the criteria for test procedure waivers.

10 CFR 431.401(a)(1).

DOE notes that it may modify or rescind the waiver at any time upon DOE's determination that the factual basis underlying the petition for waiver is incorrect, or upon a determination that the results from the alternate test procedure are unrepresentative of the basic models' true energy consumption characteristics. 10 CFR 431.401(k)(1). Likewise, Air Innovations may request that DOE rescind or modify the waiver if the company discovers an error in the information provided to DOE as part of its petition, determines that the waiver is no longer needed, or for other appropriate reasons. 10 CFR 431.401(k)(2).

As set forth previously, the test procedure specified in this Decision and Order is not the same as the test procedure offered by Air Innovations. If Air Innovations believes that the alternate test method it suggested provides representative results and is less burdensome than the test method required by this Decision and Order, Air Innovations may submit a request for modification under 10 CFR 431.401(k)(2) that addresses the concerns that DOE has specified with that procedure. Air Innovations may also submit another less burdensome alternative test procedure not expressly considered in this notification under the same provision.

### **III. Order**

After careful consideration of all the material that was submitted by Air Innovations, the various public-facing materials (*e.g.*, marketing materials, product specification sheets, and installation manuals) for the units identified in the petition, information provided by Air Innovations and other wine cellar walk-in refrigeration system manufacturers in meetings with DOE, and the comment received, in this matter, it is **ORDERED** that:

(1) Air Innovations must, as of the date of publication of this Order in the *Federal Register*, test and rate the following Air Innovations-branded wine cellar walk-in cooler refrigeration system basic models with the alternate test procedure as set forth in paragraph (2):

Through-The-Wall	Ducted Self-Contained	Ducted Split System	Ductless Split System
TTW018	D025	DS025	SS018
	D050	DS050	CS025
	D088	DS088	CS050
	D0200	DS200	

(2) The alternate test procedure for the Air Innovations basic models listed in paragraph (1) of this Order is the test procedure for Walk-in Cooler Refrigeration Systems prescribed by DOE at 10 CFR part 431, subpart R, appendix C, (“Appendix C to Subpart R”) with the modifications provided below. All other requirements of Appendix C and DOE's other relevant regulations remain applicable.

In Appendix C to Subpart R, revise section 3.1.1 (which specifies modifications to AHRI 1250-2009 (incorporated by reference; see §431.303)) to read:

3.1.1. In Table 1, Instrumentation Accuracy, refrigerant temperature measurements shall have an accuracy of  $\pm 0.5$  °F for unit cooler in/out. Measurements used to determine temperature or water vapor content of the air (*i.e.* wet bulb or dew point) shall be accurate to within  $\pm 0.25$  °F; all other temperature measurements shall be accurate to within  $\pm 1.0$  °F.

In Appendix C to Subpart R, revise section 3.1.4 (which specifies modifications to AHRI 1250-2009) and add modifications of AHRI 1250-2009 Tables 3 and 4 to read:

3.1.4. In Tables 3 and 4 of AHRI 1250-2009, Section 5, the Condenser Air Entering Wet-Bulb Temperature requirement applies only to single-packaged dedicated systems. Tables 3 and 4 shall be modified to read:

<b>Table 3. Fixed Capacity Matched Refrigerator System and Single-Packaged Dedicated System, Condensing Unit Located Indoor</b>						
<b>Test Description</b>	<b>Unit Cooler Air Entering Dry-Bulb, °F</b>	<b>Unit Cooler Air Entering Relative Humidity,%<sup>1</sup></b>	<b>Condenser Air Entering Dry-Bulb, °F</b>	<b>Maximum Condenser Air Entering Wet-Bulb, °F</b>	<b>Compressor Status</b>	<b>Test Objective</b>
Evaporator Fan Power	55	55	-	-	-	Measure fan input wattage <sup>2</sup>
Refrigeration Capacity	55	55	90	65 <sup>3</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at Rating Condition
Notes: <ol style="list-style-type: none"> <li>1. The test condition tolerance (maximum permissible variation of the average value of the measurement from the specified test condition) for relative humidity is 3%.</li> <li>2. Measure fan input wattage either by measuring total system power when the compressor and condenser are turned off or by separately submetering the evaporator fan.</li> <li>3. Maximum allowable value for Single-Packaged Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.</li> </ol>						

<b>Table 4. Fixed Capacity Matched Refrigerator System and Single-Packaged Dedicated System, Condensing Unit Located Outdoor</b>						
<b>Test Description</b>	<b>Unit Cooler Air Entering Dry-Bulb, °F</b>	<b>Unit Cooler Air Entering Relative Humidity, %<sup>1</sup></b>	<b>Condenser Air Entering Dry-Bulb, °F</b>	<b>Maximum Condenser Air Entering Wet-Bulb, °F</b>	<b>Compressor Status</b>	<b>Test Objective</b>
Evaporator Fan Power	55	55	-	-	-	Measure fan input wattage <sup>2</sup>
Refrigeration Capacity A	55	55	95	68 <sup>3</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at Rating Condition

Refrigeration Capacity B	55	55	59	46 <sup>3</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at moderate condition
Refrigeration Capacity C	55	55	35	29 <sup>3</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at cold condition
Notes: <ol style="list-style-type: none"> <li>1. The test condition tolerance (maximum permissible variation of the average value of the measurement from the specified test condition) for relative humidity is 3%.</li> <li>2. Measure fan input wattage either by measuring total system power when the compressor and condenser are turned off or by separately submetering the evaporator fan.</li> <li>3. Maximum allowable value for Single-Packaged Dedicated Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.</li> </ol>						

In Appendix C to Subpart R, following section 3.2.5 (instructions regarding modifications to AHRI 1250-2009), add sections 3.2.6 and 3.2.7 to read:

3.2.6 The purpose in section C1 of appendix C is modified by extending it to include Single-Packaged Dedicated Systems.

3.2.7 For general test conditions and data recording (appendix C, section C7), the test acceptance criteria in Table 2 and the data to be recorded in Table C2 apply to the Dual Instrumentation and Calibrated Box methods of test.

In Appendix C to Subpart R, revise section 3.3 to read:

3.3. *Matched systems, single-packaged dedicated systems, and unit coolers tested alone:* Test any split system wine cellar walk-in refrigeration system as a matched pair. Any condensing unit or unit cooler component must be matched with a corresponding counterpart for testing. Use the test method in AHRI 1250-2009 (incorporated by reference; see §431.303), appendix C as the method of test for matched refrigeration

systems, single-packaged dedicated systems, or unit coolers tested alone, with the following modifications:

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In Appendix C to Subpart R, revise sections 3.3.3 through 3.3.3.2 to read:

*3.3.3 Evaporator fan power.*

3.3.3.1 The unit cooler fan power consumption shall be measured in accordance with the requirements in Section C3.5 of AHRI 1250-2009. This measurement shall be made with the fan operating at full speed, either measuring unit cooler or total system power input upon the completion of the steady state test when the compressors and condenser fan of the walk-in system is turned off, or by submetered measurement of the evaporator fan power during the steady state test.

Section C3.5 of AHRI 1250-2009 is revised to read:

*Unit Cooler Fan Power Measurement.* The following shall be measured and recorded during a fan power test.

$EF_{comp,on}$	Total electrical power input to fan motor(s) of Unit Cooler, W
FS	Fan speed (s), rpm
N	Number of motors
$P_b$	Barometric pressure, in. Hg
$T_{db}$	Dry-bulb temperature of air at inlet, °F
$T_{wb}$	Wet-bulb temperature of air at inlet, °F

V Voltage of each phase, V

For a given motor winding configuration, the total power input shall be measured at the highest nameplated voltage. For three-phase power, voltage imbalance shall be no more than 2 %.

3.3.3.2 Evaporator fan power for the off-cycle is equal to the on-cycle evaporator fan power with a run time of ten percent of the off-cycle time.

$$EF_{comp,off} = 0.1 \times EF_{comp,on}$$

In Appendix C to Subpart R, following section 3.3.7.2, add new sections 3.3.8, 3.3.9, and 3.3.10 to read:

3.3.8. Measure power and capacity of single-packaged dedicated systems as described in sections C4.1.2 and C9 of AHRI 1250-2020. The third and fourth sentences of Section C9.1.1.1 of AHRI 1250-2020 (“Entering air is to be sufficiently dry as to not produce frost on the Unit Cooler coil. Therefore, only sensible capacity measured by dry bulb change shall be used to calculate capacity.”) shall not apply.

3.3.9. For systems with ducted evaporator air, or that can be installed with or without ducted evaporator air: Connect ductwork on both the inlet and outlet connections and determine external static pressure as described in ASHRAE 37-2009, sections 6.4 and 6.5. Use pressure measurement instrumentation as described in ASHRAE 37-2009 section 5.3.2. Test at the fan speed specified in manufacturer installation instructions—if there is more than one fan speed setting and the installation instructions do not specify which speed to use, test at the highest speed. Conduct tests with the external static pressure equal to 50 percent of the maximum external static pressure allowed by the manufacturer for system installation within a tolerance of -0.00/+0.05 in. wc. If testing



with the indoor air enthalpy method, adjust the airflow measurement apparatus fan to set the external static pressure—otherwise, set the external static pressure by symmetrically restricting the outlet of the test duct. In case of conflict, these requirements for setting evaporator airflow take precedence over airflow values specified in manufacturer installation instructions or product literature.

3.3.10. For systems with ducted condenser air, or that can be installed with or without ducted condenser air: Connect ductwork on both the inlet and outlet connections and determine external static pressure as described in ASHRAE 37-2009, sections 6.4 and 6.5. Use pressure measurement instrumentation as described in ASHRAE 37-2009 section 5.3.2. Test at the fan speed specified in manufacturer installation instructions—if there is more than one fan speed setting and the installation instructions do not specify which speed to use, test at the highest speed. Conduct tests with the external static pressure equal to 50 percent of the maximum external static pressure allowed by the manufacturer for system installation within a tolerance of -0.00/+0.05 in. wc. If testing with the outdoor enthalpy method, adjust the airflow measurement apparatus fan to set the external static pressure—otherwise, set the external static pressure by symmetrically restricting the outlet of the test duct. In case of conflict, these requirements for setting condenser airflow take precedence over airflow values specified in manufacturer installation instructions or product literature. If testing using the outdoor air enthalpy method, the requirements of section 8.6 of ASHRAE 37-2009 are not applicable.

In Appendix C to Subpart R, revise section 3.3.6 (which specifies modifications to AHRI 1250-2009) to read:

3.3.6. AWEF is calculated on the basis that walk-in box load is equal to half of the system net capacity, without variation according to high and low load periods and without variation with outdoor air temperature for outdoor refrigeration systems, and the

test must be done as a matched or single-package refrigeration system, as follows:

For Indoor Condensing Units:

$$\dot{B}L = 0.5 \cdot \dot{q}_{ss}(90 \text{ } F)$$

$$LF = \frac{\dot{B}L + 3.412 \cdot \dot{E}F_{comp,off}}{\dot{q}_{ss}(90 \text{ } F) + 3.412 \cdot \dot{E}F_{comp,off}}$$

$$AWEF = \frac{\dot{B}L}{\dot{E}_{ss}(90 \text{ } F) \cdot LF + \dot{E}F_{comp,off} \cdot (1 - LF)}$$

For Outdoor Condensing Units:

$$\dot{B}L = 0.5 \cdot \dot{q}_{ss}(95 \text{ } F)$$

$$LF(t_j) = \frac{\dot{B}L + 3.412 \cdot \dot{E}F_{comp,off}}{\dot{q}_{ss}(t_j) + 3.412 \cdot \dot{E}F_{comp,off}}$$

$$AWEF = \frac{\sum_{j=1}^n BL(t_j)}{\sum_{j=1}^n E(t_j)}$$

$$BL(t_j) = \dot{B}L \cdot n_j$$

$$E(t_j) = [\dot{E}_{ss}(t_j) \cdot LF(t_j) + \dot{E}F_{comp,off} \cdot (1 - LF(t_j))] \cdot n_j$$

Where:  $\dot{B}L$  is the non-equipment-related box load

LF is the load factor

And other symbols are as defined in AHRI 1250-2009.

(3) *Representations.* Air Innovations may not make representations about the efficiency of a basic model listed in paragraph (1) of this Order for compliance, marketing, or other purposes unless the basic model has been tested in accordance with the provisions set forth above and such representations fairly disclose the results of such testing.

(4) This waiver shall remain in effect according to the provisions of 10 CFR 431.401.

(5) This Order is issued on the condition that the statements, representations, and information provided by Air Innovations are valid. If Air Innovations makes any modifications to the

controls or configurations of a basic model subject to this Order, such modifications will render the waiver invalid with respect to that basic model, and Air Innovations will either be required to use the current Federal test method or submit a new application for a test procedure waiver. DOE may rescind or modify this waiver at any time if it determines the factual basis underlying the petition for waiver is incorrect, or the results from the alternate test procedure are unrepresentative of a basic model's true energy consumption characteristics. 10 CFR 431.401(k)(1). Likewise, Air Innovations may request that DOE rescind or modify the waiver if Air Innovations discovers an error in the information provided to DOE as part of its petition, determines that the waiver is no longer needed, or for other appropriate reasons. 10 CFR 431.401(k)(2).

(6) Air Innovations remains obligated to fulfill any applicable requirements set forth at 10 CFR part 429.

DOE makes decisions on waivers and interim waivers for only those basic models specifically set out in the petition, not future models that may be manufactured by the petitioner. Air Innovations may submit a new or amended petition for waiver and request for grant of interim waiver, as appropriate, for additional basic models of Walk-in Cooler Refrigeration Systems. Alternatively, if appropriate, Air Innovations may request that DOE extend the scope of a waiver or an interim waiver to include additional basic models employing the same technology as the basic model(s) set forth in the original petition consistent with 10 CFR 431.401(g).

**Signing Authority**

This document of the Department of Energy was signed on April 27, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on April 28, 2021.

Treena V. Garrett,  
Federal Register Liaison Officer,  
U.S. Department of Energy.

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